

■ Chiron-Werke GmbH & Co. KG, Germany

Efficiency in Complete Processing

The new 5-axis production center from Chiron optimizes the production of compressor wheels. A Sinumerik 840D sl improves the fast and precise production by approximately ten percent.



With its new, highly dynamic milling machine, Chiron produces a complete compressor wheel in two minutes

Chiron is one of the world's leading producers of vertical production centers. Based in Tuttlingen, Germany, the company has made a name for itself with the quality and speed of its production machines. Chiron meets customer demands with regard to minimum piece costs at maximum productivity. In addition to machine production, Chiron specializes in turnkey projects that include the selection of the devices, tools, numerical control programs, and automation components apart from the machines. Claus Eppler, chief executive officer for research and development of Chiron sees a clear trend toward the production of complex series workpieces: "Since the reclamping is

omitted, the demand for machines for 5-axis processing with which higher accuracy can be achieved is increasing." To meet the productivity demands of such parts, the machine manufacturer has implemented these requirements in its new FZ 08K S MAGNUM 5-axis milling center. Use of this machine reduces the total machining time, and thus considerably reduces the piece costs, a process to which the milling center's controller – a Sinumerik 840D sl – makes a major contribution.

The workpieces produced on the new milling center include, among other things, compressor wheels for the turbochargers of combustion engines. Because

those wheels are exposed to enormous forces and high temperatures, they are made from a special aluminum alloy. Eppler describes the advantages of the solution: "With the highly dynamic machines for fast 5-axis free-forming surface processing, a compressor wheel is made from the pre-turned blank in two minutes – a result which was improved by approximately 10 percent with the new controller."

Optimum cutting conditions

Various functions of the Sinumerik 840D sl, which support the entire machining process from work preparation and setup of the CNC controller to production, contribute to the new milling center's improved performance. The new optimized compressor ensures maximum machining speed and exact



The functions of the Sinumerik 840D sl ensure the increased performance of the new milling center

contour accuracy and therefore better results in 5-axis simultaneous milling by more homogeneous transitions at set limits. Intelligent jerk protection protects the machine's mechanics. It enables gentle acceleration and deceleration of the axes despite its dynamic response and therefore prolongs the life of the machine. "Only machines which run at high precision can meet the high demands of a 5-axis processing," Eppler stresses. "The prerequisite for this is that the tool and round axes are correctly aligned to each other." With the Cycle996 tool, the manufacturers have a kinematic measuring cycle that automatically measures the round axis vectors by means of a calibration sphere and a measuring

probe. And with the Traori tool center point programming, the controller converts the position and alignment data into machine movements and generates the right traversing movements depending on the kinematic. "The customer achieves his best possible performance by optimum adaptation of all the process-relevant parameters," Eppler sums up.

Simple assembly with Drive-Cliq

For 5-axis simultaneous milling, the machine is fitted with the new Chiron 2-axis tilting rotary table, the round axes of which drive 1FW6 torque motors, which feature a very high dynamic response and freedom from maintenance. Five sides can be processed completely in one clamping by this. Simultaneous turning operations with the C axis are also possible up to a speed of 1,000 revolutions per minute. The high precision and quality demands also led to the incorporation of spindle units from Weiss Spindeltechnologie GmbH, a Siemens subsidiary. In connection with the tool holder for HSK 40 tools, the spindles accelerate highly dynamically up to a maximum speed of 40,000 revolutions per minute. For the machine tool's drive, the machine manufacturer uses newly developed synchronous motors from the 1FT7 series, which are designed for high-performance motion control applications. Together with the Sinamics S120 drive system, they ensure maximum precision and very short cycle times in the production machines. Drive-Cliq is the communication medium for real-time transmission of control data of the Sinamics drive components. The internal drive interface links Sinumerik and Sinamics with the encoders in the motors.

Power-saving potential

"The central topic where investment decisions are concerned is now the energy efficiency of the machine," explains Eppler. "Since the machine and all its subunits consume a considerable amount of energy even in the unproductive standby times, there is an enormous energy-saving potential in reducing the standby times. The faster the work-piece is produced, the greater the energy productivity. The machine can be switched off automatically by the Chiron Power-Safe function directly after finishing the job." The tool change systems, with changing times from 0.5 second, used in the new milling centers also increase the efficiency. "This brings a lead with very short chip-to-chip times from 1.2 seconds, which can add up to several hundred hours at the end of the year," Eppler concludes. ■

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